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Corynesporopsis hainanensis sp. nov., a bambusicolous fungus from southern China

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Abstract—A new anamorphic species, *Corynesporopsis hainanensis*, is described and illustrated from dead bamboo culms collected in the tropical mountain rainforest of Jianfengling, Hainan, China. The fungus is characterized by its terminal monotretic conidiogenous cells with catenate, obclavate, brown to pale brown, smooth, (3–)5–6(–10)-euseptate conidia. A dichotomous key and a synoptic table to *Corynesporopsis* species are provided.

Key words—asexual fungi, hyphomycetes, saprobes, taxonomy, *Xylariales*

Introduction

Taking into account its large area, varied geographical conditions and advantageous natural environments, China is considered an important reservoir of the original bamboo diversity (Yang & Xue 1998). Its bamboo forest ecosystems offer favorable habitats for survival and multiplication of bambusicolous fungi. However, our knowledge of bambusicolous fungi is scant, and relatively little information about their taxonomy has been published in China (e.g. Zhou & al. 2001, Xu & al. 2006, 2007, Ma 2016). During our ongoing surveys of saprobic microfungi associated with plant debris, we

collected on dead bamboo culms an interesting hyphomycete with the typical morphological features of *Corynesporopsis* P.M. Kirk (Kirk 1981a). The fungus, significantly different from previously described taxa, is proposed here as new to science.

Materials & methods

Samples of litter were placed in paper and plastic bags, taken to the laboratory, and prepared according to Castañeda-Ruiz & al. (2016). Mounts were prepared in PVL (polyvinyl alcohol and lactic acid) and measurements were made at a magnification of ×1000. Micrographs were obtained with a Nikon Eclipse 80i microscope equipped with bright field and Nomarski interference optics. The type specimen was deposited in the Herbarium of Jiangxi Agricultural University, Nanchang, Jiangxi, China (HJAUP).

Taxonomy

Corynesporopsis hainanensis Z.H. Xu, Jian Ma, X.G. Zhang & R.F. Castañeda, **sp. nov.** Fig. 1

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Differs from *Corynesporopsis curvularioides*, *C. iberica,* and *C. rionensis* by its (3–)5–6(–10)-euseptate obclavate conidia; from *C. iberica* by its wider conidia; and from *C. curvularioides* and *C. rionensis* by its longer and narrower conidia.

Type: China, Hainan Province, Jianfengling National Nature Reserve, on dead culms of bamboo, 18 April 2014, J. Ma (**Holotype**, HJAUP M0377).

Etymology: refers to the province where the type was collected.

Colonies on dead wood effuse, dark brown to black, hairy. Mycelium partly superficial, partly immersed in the substratum, composed of branched, septate, pale brown to brown, smooth hyphae. Conidiophores differentiated, single, erect, unbranched, straight or slightly flexuous, brown to dark brown, smooth, septate, 45–62 × 5.5–6.5 µm, thick-walled. Conidiogenous cells monotretic, integrated, terminal, determinate, cylindrical, brown, smooth, 10–13 µm long, 4.5–5.5 µm wide. Conidial secession schizolytic. Conidia acrogenous, catenate, in unbranched, acropetal chains, obclavate, straight or curved, brown to pale brown, smooth, (3–)5–6(–10)-euseptate, 17–48 µm long, 6.5–8 µm diam. in the broadest part, 2–3 µm diam. at the truncate base.

Dissussion

Corynesporopsis was established by Kirk (1981a) with *Corynespora quercicola* Borowska [≡ *Corynesporopsis quercicola* (Borowska) P.M. Kirk] as the type species, and was mainly characterized by acrogenous, catenate, euseptate conidia seceding schizolytically from monotretic, integrated,

Fig. 1. *Corynesporopsis hainanensis* (holotype, HJAUP M0377).
A, B. Conidiophores, conidiogenous cells, and conidia; C. Conidiophores; D. Conidia.

terminal, determinate or rarely percurrently extending conidiogenous cells. It is similar to *Corynespora* Güssow, *Corynesporella* Munjal & H.S. Gill, *Hemicorynespora* M.B. Ellis, *Solicorynespora* R.F. Castañeda & W.B. Kendr., and *Corynesporina* Subram. in having monotretic conidiogenous cells (Güssow 1905, Munjal & Gill 1961, Ellis 1972, Castañeda-Ruíz & Kendrick 1990, Gams & al. 2009). However, *Corynesporopsis* differs from *Hemicorynespora* and *Solicorynespora* by its catenate conidia and from *Corynespora*, *Corynesporella*,

Table 1 Comparisons of conidia and substrates of *Corynesporopsis* species. The new species is set in **bold** font.

Species	Conidia			Habitat	Type locality
	Size (μm)	Shape and Septation	Color		
C. acaciae [1]	(10–)11–13 × (4.5–)5(–5.5)	Ellipsoidal to cylindrical, broadly rounded at the ends, 1-euseptate	Uniform	Dead wood	China
C. antillana [2]	21–28(–33) × 5–8	Ellipsoidal, (3–)5(–6)-euseptate	Variable	Dead leaves	Cuba
C. biseptata [3]	18–33 × 7–9	Cylindrical, mostly 2-euseptate	Uniform	Dead wood	UK
C. curvularioides [4]	15–35 × 7–11	Obclavate to ellipsoidal, 1–5-euseptate	Uniform	Dead branches	China
C. cylindrica [5]	12.5–20.5 × 6–7.5	Cylindrical, 1(–2)-euseptate	Uniform	Dead wood	Australia
C. excoecariae [6]	15–40 × 7.5–10.5	Cylindrical, 1–3-euseptate	Uniform	Dead branches	China
C. hainanensis	**17–48 × 6.5–8**	**Obclavate, (3–)5–6(–10)-euseptate**	**Uniform**	**Dead branches**	**China**
C. iberica [7]	15–48(–59) × 3–4	Cylindrical, (2–)3–7-euseptate	Uniform	Bark	Portugal
C. inaequiseptata [8]	17–25 × 4–5.5	Obclavate, 1-euseptate	Variable	Rotten palm petiole	Peru
C. indica [9]	(14–)17–24(–27) × 8–12(–14)	Ellipsoid to broadly obovoid, 1-euseptate	Uniform	Dead twig	India
C. isabelicae [10]	(24–)27–43.5 × 4–6.4	Elongate fusiform or elongate naviculiform, 1-euseptate	Uniform	Rotten palm petiole	Cuba
C. liquidambaris [11]	10–16.5 × 3.5–5.5	Naviculiform to ellipsoid, 1-euseptate	Uniform	Dead branches	China
C. obclavata [12]	27–61 × 6–12	Obclavate, 5–9-euseptate	Uniform	Dead branches	China
C. quercicola [13]	(12–)14–18 × 6–8(–9)	Broadly ellipsoid to cylindrical, 2-euseptate	Variable	Decaying wood	Poland
C. rionensis [14]	24–36 × 8–11 (mostly 9–10)	Fusiform, broad fusiform or ellipsoidal, 3–4(–5)-euseptate	Uniform	Rotten branches	Cuba
C. uniseptata [15]	12–16 × 5–7	Ellipsoid, 1-euseptate	Uniform	Dead leaves	UK
C. variabilis [16]	11–16 × 5–8	Ellipsoid, obclavate, sub-oblong, cylindrical, sub-pyriform to oval, 1-euseptate	Variable	Submerged dead wood	Spain

Data from: [1] Kirschner 2015; [2] Castañeda-Ruiz & Kendrick 1990; [3] Morgan-Jones 1988; [4] Xia & al. 2013; [5] Sutton 1989; [6] Xia & al. 2014; [7] Castañeda-Ruiz & al. 2011; [8] Matsushima 1993; [9] Kirk 1983; [10] Holubová-Jechová 1987; [11] Ma & al. 2012; [12] Ma 2016; [13] Kirk 1981a; [14] Holubová-Jechová & Mercado Sierra 1986; [15] Kirk 1981b [16] Hernández-Restrepo & al. 2014.

and *Corynesporina* by its euseptate conidia. *Corynesporopsis* is also similar to *Heteroconium* Petr. (Petrak, 1949) in having catenate, euseptate conidia, but *Heteroconium* is separated by monoblastic conidiogenesis.

Although *Corynesporopsis* was placed in *Xylariales* (*Sordariomycetes*) based on ITS and LSU rDNA based phylogenetic studies of *C. acaciae* R. Kirschner, its family remains incertae sedis due to its tretic conidiogenesis, previously unrecorded for *Xylariales* (Kirschner 2015). Teleomorphs and phylogenetic affinities with other *Corynesporopsis* species are not yet known.

Among the known species of *Corynesporopsis*, only *C. curvularioides* J.W. Xia & X.G. Zhang (Xia & al. 2013), *C. iberica* R.F. Castañeda & al. (Castañeda-Ruíz & al. 2011), and *C. rionensis* Hol.-Jech. (Holubová-Jechová & Mercado Sierra 1986) are comparable to *C. hainanensis*. However, *C. curvularioides* differs in its obclavate to ellipsoidal, shorter and wider conidia with 1–5 eusepta; *C. iberica* differs in its cylindrical, narrower conidia with (2–)3–7 eusepta; while *C. rionensis* differs in its wider fusiform, broadly fusiform, or ellipsoidal conidia with 3–4(–5) eusepta.

With the addition of *C. hainanensis*, *Corynesporopsis* currently contains 17 species. A synopsis for comparisons of conidia and substrates of these accepted species is presented in Table 1. The conidia of these 17 *Corynesporopsis* species are mostly ellipsoidal, cylindrical, obclavate, or fusiform, but conidia may also be obovoid, naviculiform, sub-oblong, sub-pyriform, or oval. The conidia are mostly unicolored, but *C. antillana* R.F. Castañeda & W.B. Kendr., *C. inaequiseptata* Matsush., *C. quercicola*, and *C. variabilis* R.F. Castañeda & al. produce versicolored conidia. Eight species produce predominately 1-septate conidia, usually thickened and darkened at the septa—*C. acacia, C. cylindrica* B. Sutton, *C. indica* P.M. Kirk, *C. isabelicae* Hol.-Jech., *C. liquidambaris* Jian Ma & X.G. Zhang, *C. uniseptata* P.M. Kirk, *C. inaequiseptata*, and *C. variabilis*—while the other *Corynesporopsis* species produce conidia with more septa. All species were found as saprobes on bark, decaying leaves, rotten wood, or dead palm rachides in terrestrial environments, except for *C. variabilis* on submerged dead wood. Fourteen species definitely produce smooth-walled conidia; the conidial ornamentation of the other three species (*C. uniseptata*, *C. curvularioides* and *C. excoecariae* J.W. Xia & X.G. Zhang) is inexplicably omitted in their original descriptions (Kirk 1981b, Xia & al. 2013, 2014).

Keys to species of *Corynesporopsis* have been provided by Castañeda-Ruiz & al. (2011) and Hernandez-Restrepo & al. (2014), based on conidial morphology. The following expanded key includes all 17 accepted *Corynesporopsis* species.

Key to *Corynesporopsis* species

1. Conidia predominantly 1-euseptate 2
1. Conidia predominantly 2 or more septa 9
2. Conidia versicolorous 3
2. Conidia concolorous 4
3. Conidia obclavate, 17–25 × 4–5.5 µm ..... *C. inaequiseptata*
3. Conidia variable ellipsoid, obclavate, sub-oblong, cylindrical, sub-pyriform to oval, 11–16 × 5–8 µm ..... *C. variabilis*
4. Conidia (14–)17–24(–27) × 8–12(–14) µm ..... *C. indica*
4. Conidia not exceeding 7.5 µm diam. 5
5. Conidia (24–)27–43.5 × 4–6.4 µm, elongate fusiform or elongate naviculiform ..... *C. isabelicae*
5. Conidia not exceeding 20.5 µm long 6
6. Conidia strictly cylindrical or ellipsoidal 7
6. Conidia ellipsoidal to cylindrical, or naviculiform to ellipsoid 8
7. Conidia cylindrical, 12.5–20.5 × 6–7.5 µm ..... *C. cylindrica*
7. Conidia ellipsoidal, 12–16 × 5–7 µm ..... *C. uniseptata*
8. Conidia ellipsoidal to cylindrical, (10–)11–13 × (4.5–)5(–5.5) µm ..... *C. acaciae*
8. Conidia naviculiform to ellipsoid, 10–16.5 × 3.5–5.5 µm ..... *C. liquidambaris*
9. Conidia versicolorous 10
9. Conidia concolorous 11
10. Conidia ellipsoidal, 21–28(–33) × 5–8 µm, (3–)5(–6)-euseptate ..... *C. antillana*
10. Conidia broadly ellipsoid to cylindrical, (12–)14–18 × 6–8(–9) µm, 2-euseptate ..... *C. quercicola*
11. Conidia cylindrical 12
11. Conidia fusiform, ellipsoidal, obclavate, or obclavate to ellipsoidal 14
12. Conidia 15–48(–59) × 3–4 µm, (2–)3–7-euseptate ..... *C. iberica*
12. Conidia at least 7 µm wide 13
13. Conidia 18–33 × 7–9 µm, mostly 2-euseptate ..... *C. biseptata*
13. Conidia 15–40 × 7.5–10.5 µm, 1–3-euseptate ..... *C. excoecariae*
14. Conidia strictly obclavate 15
14. Conidia fusiform, ellipsoidal, or obclavate to ellipsoidal 16
15. Conidia 17–48 × 6.5–8 µm, (3–)5–6 (–10)-euseptate ..... *C. hainanensis*
15. Conidia 27–61 × 6–12 µm, 5–9-euseptate ..... *C. obclavata*
16. Conidia obclavate to ellipsoidal, 15–35 × 7–11 µm, 1–5-euseptate ..... *C. curvularioides*
16. Conidia fusiform or ellipsoidal, 24–36 × 8–11 (mostly 9–10) µm, 3–4(–5)-euseptate ..... *C. rionensis*

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